REMARKS

The Office Action mailed May 17, 2007, and made final, has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-24 and 26 are now pending in this application. Claims 1-8, 10-18, and 20-25 stand rejected. Claims 9 and 19 stand objected to. Claim 25 has been canceled without prejudice, waiver, or disclaimer. Claim 26 is newly added. No additional fee is due for newly added Claim 26. No new matter has been added.

Applicant acknowledges the Examiner's indication that Claims 9 and 19 contain allowable subject matter.

The rejection of Claims 1-6, 10-16, and 20-25 under 35 U.S.C. § 103(a) as being unpatentable over Kato et al. (U.S. Pat. No. 4,317,179) ("Kato") in view of Akahori (U.S. Pub. No. 2003/0179945) ("Akahori") is respectfully traversed.

Kato describes an image processing system employing an image processing method. The method includes obtaining an unsharp mask density (Dus) that includes only a super-low frequency within an original image density (Dorg) of an original radiographed image. The unsharp mask density (Dus) is generated by blurring the original image density (Dorg) to contain only frequency components that are lower than the super-low frequency. As such, both the original image density (Dorg) and the unsharp mask density (Dus) are representative of frequencies. A signal conversion is preformed by utilizing a modulation transfer function (MTF) that is based on the difference between the original image density (Dorg) and the unsharp mask density (Dus) and on an emphasis coefficient (β). The signal conversion produces an image that emphasizes a frequency component that is above the super-low frequency. The emphasis coefficient (β) may be fixed or changed as a function of the original image density (Dorg) or the unsharp mask density (Dus). Because the image density (Dorg) and mask density (Dus) correspond to the frequency of signals, the emphasis coefficient (β) is a function based on frequency.

Further, by selecting the emphasis coefficient (β) and the unsharp mask density (Dus), a ratio of a maximum value (B) to a minimum value (A) of the modulation transfer function (MTF) can be changed. Notably, Kato does not describe or suggest obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an

image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value *T*.

Applicant respectfully traverses the assertion on page 2 of the Office Action that Kato teaches modulating a filtering operation with a gain factor that is a function of an initial pixel value. Rather, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient.

Akahori describes an image processing method that includes separating (S4) an image signal (S0) into at least low frequency components (YL), middle frequency components (YM), and high frequency components (YH). The separation (S4) may also be done based on luminance components (Y). After the separation (S4), evaluation values of the middle and high frequency components (YM and YH) are set. Values of gain (GM and GH) are set (S5) for the middle frequency components (YM) and the high frequency components (YH), respectively. For the middle frequency components (YM), the gain (GM) is selected (S5) to suppress the middle frequency components (YM), and, for the high frequency components (YH), the gain (GH) is selected (S5) to enhance the high frequency components (YH). More specifically, the medium frequency gain (GM) is set (S5) in accordance with absolute values (|YM|) of the middle frequency components (YM), and the high frequency gain (GH) is set (S5) in accordance with absolute values (|YH|) of the high frequency components (YH). The method also includes performing enhancement and suppression processing (S6) to suppress the middle frequency components (YM) and enhance the high frequency components (YH) in accordance with the respective selected gain (GM and GH).

More specifically, a middle frequency component (YM) corresponding to a pixel with an absolute value of the middle frequency component (|YM|) that is smaller than a predetermined threshold value (Th1), is more suppressed than a middle frequency component (YM) corresponding to a pixel with an absolute value of the middle frequency component (|YM|) that is larger than the predetermined threshold value (Th1). Further, a high frequency component (YH) corresponding to a pixel with an absolute value of the high frequency component (|YH|) that is smaller than a predetermined threshold value (Th2), is less enhanced than a high frequency component (YH) corresponding to a pixel with an absolute value of the high frequency component (|YH|) that is larger than the predetermined threshold value (Th2).

After enhancement and suppression (S6), the middle frequency components (YM') and the high frequency components (YH') are combined (S7 and S8) to form a processed image signal (S2). Notably, Akahori does not describe or suggest obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***.

Applicant respectfully traverses the assertion on page 2 of the Office Action that Akahori teaches a gain that is a function of a relative pixel value which is calculated based on a threshold value. Rather, Akahori describes a gain that is based on the absolute value of a frequency, and that the gain-processed frequency components are then compared to an absolute value threshold. Because, the frequency components are gain-processed then compared to the threshold, the gain in Akahori is not calculated based on the threshold.

Claim 1 recites a method for filtering images comprising "obtaining an image; and obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

Neither Kato nor Akahori, considered alone or in combination, describes or suggests a method for filtering images as recited in Claim 1. More specifically, neither Kato nor Akahori, considered alone or in combination, describes or suggests a method that includes obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient, and Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Kato in view of Akahori.

Claims 2-6 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2-6 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2-6 likewise are patentable over Kato in view of Akahori.

Claim 10 recites a method for filtering images comprising "obtaining a computed tomography (CT) image; and obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the CT image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

Neither Kato nor Akahori, considered alone or in combination, describes or suggests a method for filtering images as recited in Claim 10. More specifically, neither Kato nor Akahori, considered alone or in combination, describes or suggests a method that includes obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of a CT image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient, and Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds.

Accordingly, for at least the reasons set forth above, Claim 10 is submitted to be patentable over Kato in view of Akahori.

Claim 11 recites a computer-readable medium encoded with a program configured to "obtain an image; and obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation

with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

Neither Kato nor Akahori, considered alone or in combination, describes or suggests a computer-readable medium as recited in Claim 11. More specifically, neither Kato nor Akahori, considered alone or in combination, describes or suggests a computer-readable medium encoded with a program configured to obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient, and Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds.

Accordingly, for at least the reasons set forth above, Claim 11 is submitted to be patentable over Kato in view of Akahori.

Claims 12-16 depend, directly or indirectly, from independent Claim 11. When the recitations of Claims 12-16 are considered in combination with the recitations of Claim 11, Applicant submits that dependent Claims 12-16 likewise are patentable over Kato in view of Akahori.

Claim 20 recites a computer configured to "obtain an image; and obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

Neither Kato nor Akahori, considered alone or in combination, describes or suggests a computer as recited in Claim 20. More specifically, neither Kato nor Akahori, considered alone or in combination, describes or suggests a computer configured to obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an

image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient, and Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds.

Accordingly, for at least the reasons set forth above, Claim 20 is submitted to be patentable over Kato in view of Akahori.

Claim 21 recites a computed tomographic (CT) imaging system for filtering CT images, the imaging system comprising "a detector array having a plurality of detectors; an x-ray source positioned to emit x-rays toward the detector array; and a processor operationally coupled to the detector array, the processor configured to: obtain an image; and obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

Neither Kato nor Akahori, considered alone or in combination, describes or suggests computed tomographic (CT) imaging system for filtering CT images as recited in Claim 21. More specifically, neither Kato nor Akahori, considered alone or in combination, describes or suggests an imaging system that includes a processor configured to obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient, and Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds.

Accordingly, for at least the reasons set forth above, Claim 21 is submitted to be patentable over Kato in view of Akahori.

Claim 25 has been canceled. Claims 22-24 depend, directly or indirectly, from independent Claim 21. When the recitations of Claims 22-24 are considered in combination with the recitations of Claim 21, Applicant submits that dependent Claims 22-24 likewise are patentable over Kato in view of Akahori.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 1-6, 10-16, and 20-25 be withdrawn.

The rejection of Claims 7, 8, 17, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Kato in view of Akahori, and further in view of Nakamura (U.S. Pat. No. 5,649,031) ("Nakamura") is respectfully traversed.

Kato and Akahori are described above.

Nakamura describes a method for filtering that includes calculating mean densities (A(b), A(d), A(h), A(l), and A(n)) of specified pixels (b, d, h, l, and n) in respective pixel regions, and calculating an edge enhancement value (E(b), E(d), E(h), E(l), and E(n)) with respect to each respective pixel (b, d, h, l, and n). Results of each calculation are used as coefficients of a dot filter. Notably, Nakamura does not describe or suggest obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***.

Claim 1 recites a method for filtering images comprising "obtaining an image; and obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

None of Kato, Akahori, and Nakamura, considered alone or in combination, describe or suggest a method for filtering images as recited in Claim 1. More specifically, none of Kato, Akahori, and Nakamura, considered alone or in combination, describe or suggest a

method that includes obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient, Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds, and Nakamura describes a filtering method that includes a process for obtaining coefficients for a dot filter.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Kato in view of Akahori, and further in view of Nakamura.

Claims 7 and 8 depend indirectly from independent Claim 1. When the recitations of Claims 7 and 8 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 7 and 8 likewise are patentable over Kato in view of Akahori, and further in view of Nakamura.

Claim 11 recites a computer-readable medium encoded with a program configured to "obtain an image; and obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***."

None of Kato, Akahori, and Nakamura, considered alone or in combination, describe nor suggest a computer-readable medium as recited in Claim 11. More specifically, none of Kato, Akahori, and Nakamura, considered alone or in combination, describe or suggest a computer-readable medium encoded with a program configured to obtain a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value, the relative pixel value calculated based on a threshold value ***T***. Rather, in contrast to the present invention, Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask

density and on an emphasis coefficient, Akahori describes selecting gains in accordance with absolute values of medium and high frequency components, and comparing the absolute values of pixels within the medium and high frequency components to respective medium and high frequency component absolute value thresholds, and Nakamura describes a filtering method that includes a process for obtaining coefficients for a dot filter.

Accordingly, for at least the reasons set forth above, Claim 11 is submitted to be patentable over Kato in view of Akahori, and further in view of Nakamura.

Claims 17 and 18 depend indirectly from independent Claim 11. When the recitations of Claims 17 and 18 are considered in combination with the recitations of Claim 11, Applicant submits that dependent Claims 17 and 18 likewise are patentable over Kato in view of Akahori, and further in view of Nakamura.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 7, 8, 17, and 18 be withdrawn.

Newly added Claim 26 depends from independent Claim 21, which Applicant submits is patentable over the cited art. For at least the reasons set forth above, Applicant respectfully submits that Claim 26 is also patentable over the cited art.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,

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